ITSO
Certification and Testing Manual
Version 2.6

VERSION CONTROL

Manual : ITSO Certification and Testing

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ABOUT THIS DOCUMENT

0.1. Scope

This document describes all aspects of ITSO's Interoperability Certification and Testing process. This includes an overview of the certification cycle, certification test issues as well as administrative issues. It deals with the role of ITSO, the ITSO Registered Supplier (Manufacturer, Developer and/or Vendor) and the Testing Laboratory in this process. It does not describe the test methodology or the test tool design.

0.2. How This Manual is organised

This manual is divided into the following chapters:

Executive Summary, gives an overview of the content of the document.

Chapter 1 – Introduction, defines the concepts and terminology used throughout this Manual.

Chapter 2 – The ITSO Certification Process, gives a detailed description of the different steps from the application for certification through to the issuing of the certificate.

Chapter 3 – Certification and Testing Categories, describes the requirements, purpose and tests to be carried out on each category of Product.

Chapter 4 - The ITSO Interoperability Warehouse, deals with the management of the warehouse.

Chapter 5 - Normative References.

0.3. Audience

This document is intended for:

- ITSO Executive
- Testing Laboratory(s)
- ITSO Licensed Members
- ITSO Registered Suppliers

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EXECUTIVE SUMMARY

This document describes the ITSO Testing and Certification process. The Policies it relates to are subject to the approval of the ITSO Board.

Interoperability is the ability of systems to provide services to, and accept services from, other systems and to use the services so exchanged to enable them to operate effectively together. Certification is the evaluation and testing of the Product (and system) against requirements and the award by ITSO of a Certificate of Compliance to the ITSO Specification. ITSO carries out testing using accredited Test Tools and Test Scripts.

This document includes an overview of the certification cycle, starting from the application by the ITSO Registered Supplier, the execution of tests against the ITSO Specification, and the Interoperability Demonstration and Benchmark Transaction Time Testing in the ITSO Warehouse. It details the roles of ITSO, the ITSO Registered Supplier and the Testing Laboratory in this cycle.

It also focuses on reporting, benchmarking, interoperability warehouse management and security.

Its aim is to provide a better understanding of the ITSO Testing, Interoperability, Benchmarking and Certification process.

The test methodology and the test tools and their design are outside of the scope of this document.

1. INTRODUCTION

1.1. ITSO Testing and Certification Processes

ITSO provides a range of Testing and Certification services to enable ITSO Licensed Members to competitively procure and maintain Products within the ITSO Environment. This manual identifies what Products ITSO will be certifying in terms of the media, Product or systems categories and what its functionality should be. In general terms, ITSO tests both for compliance with the Specification and full Interoperability including the original criterion of ITSO Interoperability: any media, anywhere. ITSO also looks for the ease of implementation of new products (ITSO Product Entities - IPEs) in the future particularly with respect to avoiding significant upgrade costs in software development. Benchmark Transaction Time Testing is carried out for all Media and POSTs.

There are four separate categories for which certification is provided: Customer Media (CM), Personalisation Terminals (PersoPOST), Point of Service Terminals (POST), and Host Operator or Processing Systems (HOPS). POSTs can be certified according to categories defined by their usage and the sectors in which they operate. HOPS are subdivided into Collection & Forwarding, Shell Accounting, Product Accounting and Asset Management Services functions. Normally, Product and software will be certified for the functionality of one or other of these categories. However in some circumstances, full functionality may not be either appropriate or necessary: for example “Low Memory” Media can only support a limited IPE set; some HOPS may only provide specific components, for example Asset Management Services (AMS); or Personalisation Posts may only load ITSO Shells to specific media. CMs and POSTs (other than PersoPOSTs) must however aim in all circumstances to achieve or better benchmark timings for transactions set out in the Specification. In those circumstances where the POST is off-line and/or constrained by self-contained power considerations, ITSO may allow more limited functionality and/or extended benchmark timings; these are detailed on the ITSO web-site. The details of any POST’s limitations on functionality and timings will be shown in a Schedule to the Certificate issued.

ITSO provide a level of approval below full Certification, known as “Approval”. ITSO CM Approval or Compliance Certificate is designed to allow media suppliers to gain approval for their media without the necessity to test against all IPE types and all certified POST Products. For POST Sub-assemblies, Approval is given to allow suppliers to provide sub-assemblies intended for incorporation into other Product; in these circumstances, interfaces must be supplied allowing the sub-assembly to communicate with other relevant sub-assemblies, applicable CM or HOPS. The Approval Certificate will identify the nature of the sub-assembly interface in a Schedule. ITSO Approval is also available for simple Point of Service Terminals (e.g. Inspection Devices) that do not contain an ISAM and are not therefore capable of creating, modifying or deleting ITSO Products.

Where Product and / or systems are submitted covering both POST and HOPS functionality in one integrated system, then the interoperability testing may be restricted to the external interfaces of the integrated system: for instance, the media to integrated systems or the integrated system to other HOPS etc. In this case the certificate issued would clearly identify the private bespoke nature of the terminal (POST) interface with the back office (HOPS).

When a media, Product or system has been Approved or Certified by ITSO, a dated Approval or Compliance Certificate is issued to the Supplier or Member with fixed validity. A copy of all valid Approvals and Compliance Certificates, and details of the media, Product or systems to which they relate (including version numbers etc) is available on the ITSO website. It is an ITSO Member’s Operating License requirement to validate that any media, Product or software used is ITSO compliant and, by reference to their Certificates and Schedules, provides the specific functionality required by the ITSO License.

Further details of functionality can be found in the ITSO Operating License and the ITSO Specification, copies of which are available on the ITSO website. The ITSO Test Tools are available from the ITSO

Independent Test Laboratory, details of which are also available on the ITSO website. The ITSO Test List is available on the ITSO website.

1.2. Interoperability Testing

The definition of Interoperability according to the IEEE 90 is: *"The ability of two or more systems or components to exchange information and to use the information that has been exchanged."*

ITSO certifies a Product's Compliance with the ITSO Specification and validates its Interoperability with other products through their interfaces. *Interoperability* relates to *Compliance* in the sense that a Product is *compliant* with the standard as determined by a series of Tests, and is then shown to be *interoperable* with other Products that meet the same standard.

The main advantages of interoperability are a positive effect on the overall full-life cost of building and procuring a system and the increased ability to extend or replace elements of a system.

- Because of interoperability, a Licensed Member can choose between different products offering the same functionality and is not bound to the same vendor when procuring a composite system. This open supplier market with increased competition will potentially increase quality and reduce the initial and whole-life costs.
- From the ITSO Registered Supplier's point of view interoperability allows common investment in product development. Since all products support a common standard, hardware and software are interchangeable.
- ITSO Registered Supplier's proprietary solutions will only work within a limited number of systems. By developing for more open systems, this ultimately results in a bigger market.
- Open systems encourage and facilitate the exchange of information across the Registered Supplier and Licensed Operator communities and leads to the development of new applications in new fields.
-

1.3. Benchmark Testing

Benchmark Transaction Time Testing is required to evaluate the speed of media and Products in the field. Transportation demands fast transaction times and the Benchmark Transaction Time Tests are designed to replicate likely scenarios of simple and complex transactions for each type of Media and POST. Benchmark Testing is not carried out on Personalisation POSTs and HOPS.

1.4. Accreditation of Test Tools

Certification is the inspection, evaluation and testing of the components and system against requirements and the awarding of a Certificate of Compliance.
To do this it is necessary for ITSO to first evaluate the potential Test Tools that can be used in Certification, and the competence of Testing Laboratory(s) to carry out Tests against the ITSO Specification. Their competence to perform the Testing required is recognised through Accreditation of the Test Tool.
Testing Laboratories are required to use standardised procedures to ensure consistent replicability and reproducibility. The quality control principles and the competence required for product certification are set out in ISO/IEC Guide 65 and ISO/IEC 17025.

1.5. Certification

Certification provides formal recognition of a product's conformance to an industry standard specification, in this case the ITSO Specification.

This allows:

- ITSO Registered Suppliers to make and substantiate clear claims of conformance to the ITSO specification.
- Buyers to specify and successfully procure conforming products that will interoperate, thus reducing (but not eliminating) systems integration.

Certificates are awarded by ITSO as the Certification Organisation on the basis of successful completion of testing using the accredited Test Tools, Interoperability Testing and Benchmark Transaction Time Testing (as applicable).

ITSO Licensed Members and Registered Suppliers shall only make claims regarding Certification of their Products in respect of the scope for which Certification has been granted.

2. CERTIFICATION PROCESS

2.1. Certification Parties

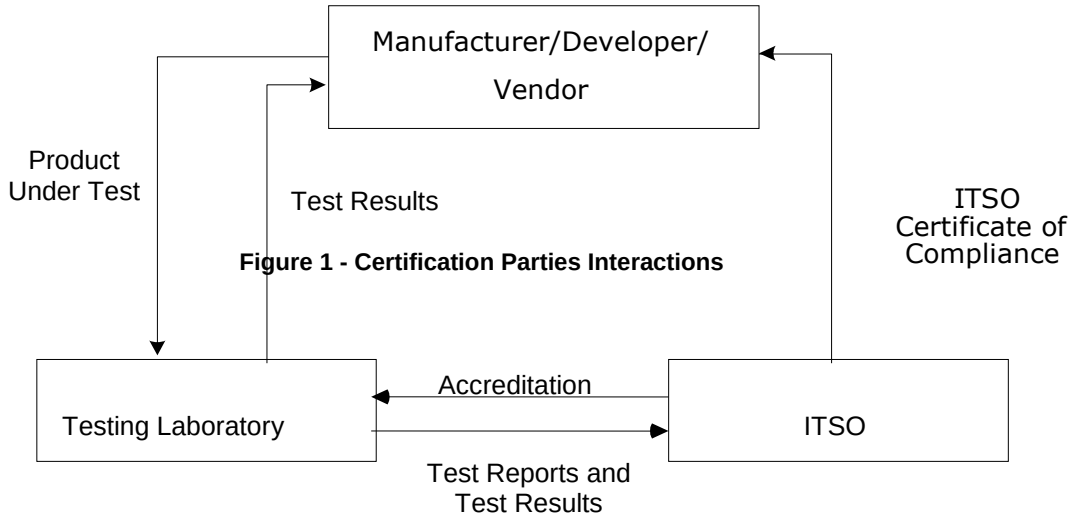

Figure 1 - Certification Parties Interactions

2.2. The Certification Organisation – ITSO

ITSO provides a secure interoperable environment for smart media. It maintains both the Specification and the ITSO Test Lists and organises technical assistance to address any questions or queries related to the specifications

.

The Testing Laboratory(s) evaluates the effectiveness of design and execute a series of Tests on Product and systems designed to operate in the ITSO environment. Based on the results of these Tests on a product, ITSO may issue an ITSO Test Certificate to an ITSO Registered Supplier.

2.2.1. Testing Laboratory

The Testing Laboratory is used by ITSO to implement and execute the Tests identified in the Test List, the Interoperability Tests and the Benchmark Transaction Time Tests. These Tests are based on the current functionality of the Product, and the Specification issued by ITSO. The Test Report and Test Results are submitted to ITSO for consideration for the issuing of a Certificate.

Note that the Test Laboratory's independence is related to the methodology used in the Interoperability Tests. By applying Black Box testing without explicit use of knowledge of the internal structure of the Product, and only based on the ITSO specification, the ITSO Testing Laboratory does not disclose the ITSO Registered Supplier's proprietary information.

2.2.2. Supplier

The Manufacturer, Developer and/or Vendor of a Product must be an ITSO Member or Registered Supplier to submit products or systems for ITSO Testing and Certification.

2.3. Version Control of Products

ITSO Registered Suppliers are required to maintain a system of Version Control over their Product and software. Only versions specified on the ITSO Certificate may be implemented and used in the ITSO Environment by ITSO Licensed Members. Version control of all ITSO Certified Product and software should take the form:

Version number; Sub-Version number; Sub-Sub-Version number

A check-sum can be incorporated after the Version number as appropriate.

Version number is incremented after every major release. This includes the addition of any major new functionality, a fundamental change that directly affects its ITSO functionality, or a significant change to the hardware.

Sub-Version number is incremented after each minor release. This includes any minor changes to hardware or software or bug fixes to components within the scope of ITSO certification.

Sub-Sub-Version number should be used for upgrades and changes that are outside the scope of ITSO certification. This number should be used by the Supplier to provide ITSO with an auditable trail of upgrades.

All initial and subsequent major *Version* releases of certified Product or software require **Full Testing** and Re-Certification.

Re-Certification of a *Sub-Version* release of certified Product or software is required, but **Limited Testing** to those tests associated with the component being changed may be allowed. **Limited Testing** will be agreed by ITSO on submission of the Certification Application Form.

No Testing or Re-Certification of a *Sub-Sub-Version* is normally required, but ITSO must be kept informed of the current version prior to release.

No version of Software shall be used in any Product that purports to be ITSO complaint unless that version has been notified to ITSO in advance of its implementation into any ITSO complaint scheme.

2.3.1. Significant Changes in a POST Hardware

For any Product dealing with the Media to POST interface, ITSO has always defined this is a materially significant area and hence any change of physical construct of a POST (including PersoPOST) will almost certainly constitute a Version Number change and therefore necessitate re-certification. This document also describes options such as the Self-Test option that will assist quicker (and cheaper) re-certification, particularly where the software is unchanged. Changes of physical hardware, for a PersoPOST include the speed and method of transport of a media through the Product; the electromagnetic/RF environment, and the physical impact of handling and printing. For POSTs it also includes the shielding effect of the ticket machine structure, interference from gate actuators, EMV Products etc. All these could affect the media and its interface and its successful loading or handling of an ITSO Shell and / or Product Entities.

2.4. Supplier Testing and use of the ITSO Test Tools

As a first step, it is strongly recommended that the ITSO Registered Supplier carries out their own internal testing using the ITSO Test Tools to gain confidence that the product to be presented for certification is mature enough to guarantee the outlook towards an efficient testing session. This can be done by performing integration (system) test at the ITSO Registered Supplier's premises. As soon as the product has enough maturity, it can be submitted for certification.

2.4.1. Supply and Use of the ITSO Test Tools

The Test Tools are available for purchase and the ITSO Test Lists are available to all ITSO Registered Suppliers.

2.4.2. Supply and Use of Test ISAMs

ITSO provides ISAMs with known parameters that can be used for development and testing of Products without the need to connect to the ITSO Security System.

Test ISAMs are available for any ITSO Member or Registered Supplier to be used in the Product that they submit to ITSO for testing for Certification applications. They are provided with either of the following profiles pre-loaded:

- HSAM
- PersoPOST
- POST.

2.5. Certification Process Cycle

This section describes the different steps (actions) taken to get through the certification process. There are three sequential Test Sessions that must be agreed with the Independent Test Laboratory.

- Completion and Reporting of all Tests identified in the Test Scope.
- Interoperability Testing.
- Benchmark Testing (not applicable to HOPS or PersoPOSTs).

2.5.1. Application for Testing and Certification

Once the ITSO Registered Supplier is ready to submit for formal Certification, they complete and submit an ITSO Certification Application Form to ITSO in advance of their planned testing slot.

The application form will include:

- Description of the product (in the certification process it will be known as Product). The description will deal with the identification of software and hardware components and whether the UUT will be supplied complete or as a set of sub-modules.
- If the application is resulting from a change to a previously certified Product or the use of Approved sub-assembly; change in build standard (as applicable).
- The functionality (role) the product will support. This will determine the tests that will have to be performed during the certification session. This should conform to the Certification & Testing Categories as laid out by the ITSO document of the same name.
- The ITSO Registered Supplier will report on previous ITSO certification certificates held for this Product, and / or whether previous versions are or have been withdrawn.
- The ITSO Registered Supplier will have to report on the status of preliminary certifications. In general, these certifications prove compatibility with (low level) standards e.g. (inter)national regulations for electrical and telecommunication equipment, EMV Level 1 for physical and electromechanical aspects of the chip card reader, ISO 14443 for contactless card readers, European Commission Low Voltage Directive 73/23/EEC for electrically powered equipment.
- Intellectual Property Rights (IPR) protect certain standards. Where this is the case the ITSO Registered Supplier has to acquire the IPR and has to prove the acquisition to ITSO.
- The ITSO Testing Laboratory can be asked to test against the immediately previous version of the ITSO Specification, but not earlier ones. ITSO reserves the right at any time to withdraw testing to any other version than the current version of the Specification.

- Registered Suppliers can apply to have their Product Certificate updated to a subsequent version of the Specification. Where the new Test Scope shows no changes from the Test List used for the original Certificate, then a new Certificate can be issued without further testing. Where changes have occurred to the Test Scope, then a new Application for Testing and Certification must be made.

To preserve the confidentiality of the documents provided by the ITSO Registered Supplier, ITSO will, if requested, sign a Non Disclosure Agreement (NDA).

2.5.2. Application for Testing and Certification using an existing Certified Product, Module or Sub-Assembly

Where the application is from an EXISTING REGISTERED SUPPLIER for an alternative embodiment of a previously certified PersoPOST, POST or HOPS of their own manufacture, and where the module is being used without change, the Registered Supplier may apply for a new version of their existing certificate. In these circumstances, the Product will only be required to undergo Interoperability Testing and Benchmark Testing (as applicable).

For a NEW SUPPLIER applying for certification of a new Product or a version of a different Supplier's PersoPOST, POST or HOPS, or a module or sub-assembly thereof, they must first apply for ITSO Registered Supplier status (free to Members but with a fee attached for non-members), then apply and pay for certification as above. ITSO will require a confirmation from the Registered Supplier who has supplied the certified PersoPOST, POST or HOPS module that the new Supplier has permission to use the other's module or sub-assembly, and any IPR associated with it, in the new Product.

In those circumstances where the Product is only available off-site (normally due to bulky or heavy equipment unsuited to loan to the ITSO Testing Laboratory), for the Interoperability Demonstration, the ITSO may arrange for an ITSO Tester to attend at the Registered Supplier's premises to execute the necessary Tests (as applicable)

Under these circumstances, and assuming the Product incorporates the earlier Certified Module unchanged and in its entirety, then the level of testing required for the new version may be limited at ITSO's discretion. Full Interoperability Testing is required under all circumstances.

For an existing ITSO Registered Supplier, successful testing will result in a new version of the original Certificate; for a new Supplier, this will be a new Certificate.

Without this Certificate, any ITSO Licensed Member (or their agent) would be in breach of their ITSO Operating Licence as they would be using non-compliant Products in the ITSO environment.

2.5.3. The ITSO Test Scope

ITSO defines specific Tests to be carried out to prove conformance to the ITSO Specification and any Corrigenda and/or Technical Notes (TN) published after that date. These Tests are published in a Test List and are related to the functionality covered by each Product and the version of the ITSO Specification.

The Application Form lists the Specification Version, functionality, Media and ITSO Products supported and for POSTs whether Products are created, modified or deleted. This determines the selection of Tests that need to be carried out. This list is the ITSO Test Scope and is used to determine the Certification Test Session and Contract.

If the Product has previously undergone testing at an ITSO Testing Laboratory, or has Self Test Results accepted by ITSO, these results will be shown against the ITSO Test Scope; Tests which are new or changed due to functionality or Specification changes will be identified.

The Test Scope will identify Tests which are new, modified or deleted from previous Test Scope(s) for that Product.

2.5.4. The Testing Laboratory Contract

Following submission of a completed application form, and NDA as appropriate, ITSO will provide an indicative quotation, deposit invoice and contract. The process is formalised in an ITSO Certification & Test Contract that:

- Identifies the Product and any previous versions, use of sub-assemblies and change to build standard (as applicable)
- Assigns the start date and expected duration
- Determines the estimated cost of the Certification & Test Service.

The ITSO Registered Supplier will also provide a list of testability requirements. These include

- The communication requirements, interfaces and protocols. If the Product does not use any of the listed interfaces, a software and/or hardware interface shall be provided by the Registered Supplier
- Access to parameters, menus etc that are normally only accessible for maintenance personal but that need to be changed during the test phase. In some cases, this means that a password will need to be disclosed.

ITSO and the Testing Laboratory are responsible for maintaining confidentiality and information provided by the Supplier will not be revealed to third parties without prior written consent.

2.5.5. The Certification Test Session

If the Product under Test has not previously been tested, then the ITSO Testing laboratory will be required to undertake all Tests identified in the Test Scope, at the ITSO Testing Laboratory premises in close co-operation with the ITSO Registered Supplier representative. The tests carried out will be derived directly from the Test Scope applicable to the Product. This will take into account any previously certified Test Reports for previous versions of the Product Under Test or any Approved sub-assembly(s) used. All Tests where functionality has been added to or modified must be included in the Test Scope to be carried out by the ITSO Testing Laboratory. A regression sample of previous tests that have not changed will be carried out.

Where there are any General Requirements (such as safety, EMC) the Testing laboratory must first check these are complied with.

As soon as the ITSO Registered Supplier fulfils its financial obligations in accordance with the ITSO Testing Laboratory Terms and Conditions then the test session can start with the ITSO Registered Supplier delivering the following to the ITSO Testing Service:

- The numbered products specified in the contract.
- The specification of the product.
- The product's installation instructions.
- User manual(s).

It is optional but highly recommended to provide a specialist member of Staff (e.g. Engineer, Programmer etc.) in order to assist operating the Product or software under test.

On a regular basis, the ITSO Testing Laboratory will publish Test Reports to the ITSO Registered Supplier. In the case of substantial deviations from the test description, the ITSO Testing Laboratory can, if requested by the ITSO Registered Supplier, report what in their opinion caused these deviations.
These Test Reports allow the ITSO Registered Supplier to continue developing the application in parallel with the certification process. This can reduce the overall certification process time. In general the total process may require some iteration before the product gets certified.

When the ITSO Registered Supplier submits a new revision of the hardware or software, the following has to be provided to the ITSO Testing Laboratory:

- A full description of the new software to be installed (if not already installed).
- Corrected or amended documentation (if applicable).

The Test Report will accumulate the results of each Test Session.

Notes:

- If the documentation provided by the ITSO Registered Supplier for the specification, installation, operation of the Product is insufficiently detailed, then the testing time will be extended which may result in additional cost to the ITSO Registered Supplier.
- The ITSO Testing Laboratory provides a testing service only and not to undertake fault finding. Therefore in cases where the Product has not been sufficiently pre-tested by the Manufacturer/Vendor, then the testing time may be significantly extended, resulting in additional cost to the ITSO Registered Supplier. In severe instances the testing may be suspended.
- Under certain circumstances (e.g. large PersoPOSTs, or server based HOPS), ITSO may agree to carry out some or all tests on a set of sub-modules of the Product containing a PC or remote server running the software plus a GUI / HMI and media reader (as appropriate). In specific circumstances, ITSO may agree to carry out testing at the ITSO Registered Supplier's premises, at the ITSO Registered Supplier's expense.
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2.5.6. Self Testing by the Registered Supplier

Subject to the criteria below, ITSO will allow Registered Suppliers to carryout **Self Testing** at their own premises and at their own expense, avoiding the necessity to submit to and have completed all testing at and by the Testing Laboratory. The Self Tests can cover all the required Tests or a sub-set.

The following criteria must be met by ITSO Registered Suppliers before ITSO will consider authorising **Self-Testing**:

- Self Testing shall only apply following successful testing and Certification of a similar Product from the same Member or Registered Supplier.
- Registered Suppliers must have or operate to a Quality Management System equivalent to that required for compliance with ISO9001:2008.
- All Tests defined by the application form must be carried out in full and in accordance with ITSO Procedures, using the latest version of the ITSO Test List.
- The Registered Supplier must purchase (or lease) and use the ITSO Test Tools and all Tests must be carried out using the ITSO Test Tool and scripts.

Once authorised, the Registered Supplier must supply to the Testing Laboratory a Report containing all test results as well as all related pieces of evidence must be delivered **prior** the start of the test session . Test results must be archived securely before submitting to the Testing Laboratory for review.

Test results shall be recorded as follows and documentation provided to enable the test house to easily verify for each test:

- Test Number
- Test Name
- Date of execution
- Name of tester (verified by a Competent Person)
- Version of the software that was used for the test.
- Test Result (Conform with "Certification & Testing Manual" – See Section 2.7)
- Comments (conform with Test Result and optionally any other comments)
- Label(s) used to identify the pieces of evidence related to this test.

- ITSO Specification Version tested against.
- ITSO Test List Version tested against.

In case a test result is not 'Pass' as defined in section 2.7, the Registered Supplier must provide ITSO and the Independent Test laboratory with a detailed description why the test is not passed.

ITSO will divide tests from defined test scope in 3 categories. This differentiation will be communicated to the client at the start of the test session. The 3 categories are:

- To be retested by the ITSO Independent Testing Laboratory
- Test evidence to be verified by the ITSO Independent Testing Laboratory
- To be carried over

In case the result of the evidence checked by the ITSO Independent Test laboratory does not match the result mentioned in the report provided by the Registered Supplier, ITSO can require a repeat of any or all tests at the ITSO Registered Supplier's cost.

ITSO (and the ITSO Independent Testing Laboratory as its agent) must have free and unfettered access to audit these Test Results.

At ITSO's request, and the ITSO Registered Supplier's cost, ITSO can require a repeat of any or all tests.

Where the ITSO Registered Supplier has a record of previous Product failing Test(s), or discrepancies are found during checking, then ITSO reserves the right to withdraw the availability of the Self-Test option at any time.

The ITSO Member or Registered Supplier will be required to provide the Product under test to the ITSO Testing Laboratory. ITSO will set the Test Scope required and any Tests that are required to be re-tested by the Independent Test Laboratory to verify correct operation of the Product.

The requirement to lodge the certified Product (or a sub-assembly) in the ITSO Interoperability Warehouse remains and it is necessary to complete the Interoperability Demonstration. Benchmark Transaction Time Testing must also be completed as appropriate.

2.6. Interoperability Testing and Demonstration

The Test Session for Media, PersoPOSTs and POSTs will include an Interoperability Demonstration.

Whereas the main Tests are intended to prove compliance with the Specification (i.e. a theoretical, abstracted interoperability), the interoperability demonstration has to prove the actual (practical) interoperability with other existing certified Product.

The ITSO Warehouse consists of a set of certified Product (or sub-sets of Product) of ITSO Registered Supplier products. During the Tests in the ITSO Warehouse, the Interoperability Testing will focus on iteration with the examples of different media types and POST configurations to ensure that the Product is tested for correct operation against relevant other products.

The Interoperability Demonstration will provoke sequences of transactions to other Product as defined in the Interoperability Demonstration Procedure. These tests will be on a 'one-to-many' basis for Customer Media and POSTs. For HOPS to HOPS, these will generally be limited to single tests against the ITSO HOPS Test Tool. The Interoperability Demonstration will verify that the Product generates, handles and processes Messages correctly.

Where the Test Scope has been carried out on a set of sub-modules that do not represent the full Product, then the Interoperability Demonstration must be carried out on the full Product for which a certificate is required, if necessary at the Registered Supplier's premises and at their expense.

2.7. Benchmark Transaction Time Testing

Benchmark Transaction Time Testing will be carried out where there is a new Customer Media, POST or modified reader/ related software is under test. For Products where no change has been made to the Customer media or the reader or its associated software or its physical construction, the Media / POST interface Benchmark Testing may, at ITSO's sole discretion, not be required to be repeated from previous Certification.

Benchmark Transaction Times are set by the ITSO Specification. The ITSO Board may approve Sector Derogations. Any agreed Sector Benchmark Transaction Timing Derogations will be documented and published on the ITSO website.

PersoPOSTs and HOPS are not required to undergo Benchmark Testing.

2.8. The Test Report and Test Results

The ITSO Testing Laboratory reports to the ITSO Registered Supplier on a regular basis. Once all the Tests on the Test Scope for the Product have been completed, at the Registered Supplier's request, the Testing Laboratory will issue the Test Report and cumulative Test Results to ITSO. ITSO will if required assess the Test Report and Test Results and provide advice. ITSO will then consider the evidence in support of the issuance of a Certificate.

The Test Report will include:

- Identification of the Test Report
- Identification of the Test Equipment used
- Name and address of the Test Laboratory
- Purpose of the evaluation
- ITSO Test List version used.
- ITSO Specification version that the tests were carried out against.
- Information on the Test Session (date, operator, attendees)
- A description of the Product tested including Manufacturer's ID, Version / build number of the main components of the application and operating system.
- Whether the Product was a complete unit or a series of sub-modules.
- Details on the configuration and functionality used in the test.
- A list of [any] optional and additional tests performed on the product.
- Summary of the Evaluation Results.
- Date and signature of the person responsible for the evaluation and Test Report.

The draft Test Report and Test Results are issued in the first instance to the ITSO Registered Supplier who can add commentary to individual Test Results before agreeing for the Test Report to be issued to ITSO for final consideration for award of a Certificate.

The Test Results will show the Test Scope for the Product and the results of all Tests completed during the current session, plus the Test Results for previous test sessions carried out on the Product and its previous versions, modules or sub-assemblies used. Results for tests no longer on the Test Scope will not be shown. It is important that a Test Result is shown for all items on the Test Scope.

The Test Report will include a summary of the status of all Test Results against the Test Scope, including results for all the Tests that failed and a description of the test conditions and symptoms that caused the defect/failure. Where applicable there will be references to additional (low level) logs to allow the ITSO Registered Supplier to trace the defect and correct it.
A defect will be classified in one of the following severity categories:

2.8.1. Fail

The test could not be executed fully or the test outcome was not as described in the ITSO Test Scope.

2.8.2. Remark – Other

The test could not be executed fully or the test outcome is not as described in the ITSO Test Scope, but this is intended by the ITSO Registered Supplier. The test result will include a justification from the ITSO Registered Supplier for the Remark. The ITSO Compliance Manager (or his designate) will decide in conjunction with the ITSO Head of Technology if this has impact on the certificate issuing process. Ideally, these cases are discussed with the ITSO Registrar before the start of the Test Session.

2.8.3. Remark – Test Environment

The test could not be executed fully or the test outcome is not as described in the ITSO Test Scope due to test environment limitations (e.g. specific test card not available).

2.8.4. Remark – Specifications

The test could not be executed fully or the test outcome is not as described in the ITSO Test Scope due to ambiguities in the ITSO Specification and/or ITSO Test List. An ITSO Support Query will be raised and the reference number will be included in the test result. Following resolution of the support query the Product under test will be expected to be rectified so that the Remark is changed to a state of PASS. This may, at ITSO's discretion, be after the Product certificate has been granted,

2.8.5. Pass

The test was executed fully and the test outcome is as described in the ITSO Test Scope.

2.9. ITSO Certificate of Compliance

On the basis of the ITSO Testing Laboratory Test Report and Test Results issued with the authority of the Registered Supplier, ITSO will take a final decision on the award of a Certificate. Only in exceptional circumstances will ITSO consider issuing a Certificate where a "Fail" has been recorded against a Test, an Interoperability Test has not been successful, or where a Product is recording Benchmark Transaction Times in excess of those specified for the Sector the Product is designed for.

The ITSO Head of Compliance will issue an ITSO Certificate of Compliance as appropriate. Only Products with an ITSO Certificate of Compliance may be used by ITSO Licensed Members in the live ITSO Environment.

The Certificate will consist of three parts:

- The Certificate consisting of a description of the Product and the Registered Supplier; the version number of the Product and its software; the version of the ITSO Specification against which it was tested; the reference number and date of the Test Report(s); the signature and title of the awarding ITSO Manager, date of award of the Certificate and its End Date.
- Schedule A which includes information on functionality where this is less than the Full Functionality as defined by the ITSO Specification; results of Benchmark Transaction Timings; and any specific operating instructions applicable to the Product when used in the ITSO Environment.
- Schedule B which details any restrictions to deployment of the Product within the ITSO Environment.
- When requested by an ITSO Licensed Operator, the ITSO Registered Supplier must supply a copy of the Test Report.

When instructed by the ITSO Head of Compliance, the ITSO Registered Supplier may be asked to carry out remedial action or improvement to a Product. Failure to do so within a reasonable time may result in a certificate being withdrawn.

All current Certificates will normally be published on the ITSO Website unless the Registered Supplier requests otherwise.

All documents relating to the award of an ITSO Certificate will be retained for a period of at least one full Certification Cycle (i.e. the period of validity of the Certificate) or as required by law.

2.9.1. ITSO Derogation

In certain specific circumstances where a Product is to be used in a local closed ITSO Environment, in advance of wider integration, a more limited certification is possible. Such options must be discussed with ITSO before progressing with Testing.

Following successful testing, the limited scope and lack of full ITSO conformance will be noted in Schedule B of the Certificate. The non-conformance and any requirement to obtain a Derogation from the ITSO Board will be detailed in the Schedule.

The award of such a certificate will not of itself allow the use of the Product. This is dependent on the ITSO Board agreeing a Derogation. This must be requested by the Licensed Member intending to use the Product and may involve specific conditions and / or time limits being applied. Registered Suppliers are not to request Derogations. Certificates requiring a Derogation will not normally be published on the ITSO web site.

2.10. ITSO Approval

ITSO Approval is issued for Media, Point of Service Terminals and Sub-Assemblies where the device is only supporting some, but not all, of the functionality of a CMD or POST, or where the Device does not itself carry out any ITSO function requiring an ISAM.

2.10.1. Media

ITSO Approval is normally only applied to Devices supporting CMD2. The Media is tested to show it can be correctly loaded with a separately certified ITSO Shell. No benchmarking is normally carried out.

2.10.2. POST sub-assemblies

For POST Sub-assemblies, Approval is given to allow suppliers to provide sub-assemblies intended for incorporation into other Product; in these circumstances, interfaces must be supplied allowing the sub-assembly to communicate with other relevant sub-assemblies, applicable CM or HOPS. The Approval Certificate will identify the nature of the sub-assembly interface in a Schedule.

2.10.3. POST

A POST that does not have the functionality to create / modify / delete an IPE, and does not have an ISAM to verify ITSO Shells or IPEs, can be considered for testing for ITSO Approval. The Device must be capable of correctly identifying the presence of an ITSO Shell on all applicable CMD plus the IPEs it is required to read and present. The Device will be required to correctly present the key customer data elements of those IPEs.

2.11. Subsequent Changes to ITSO Specification and Test List

The ITSO Test List used by the Independent Test Laboratory will be the most recent ITSO Specification version at the time of testing, or the version immediately preceding. This includes all issued corrigenda. After the ITSO Certificate of Compliance has been issued, changes to the ITSO Specification and the Test Lists may occur. Under these circumstances, the ITSO Testing Laboratory and/or the ITSO Licensed Member or ITSO Registered Supplier may be asked by ITSO to perform a revised Test Scope on the applicable certified Products held within the ITSO Warehouse as well as Interoperability Testing.

A specific timetable for achieving compliance may be set by ITSO.

In the event that the Product does not pass the nominated Test(s) then the ITSO Testing House will notify the ITSO Registered Supplier of the circumstances of the failure. Agreement will be sought between the ITSO Registered Supplier and ITSO on how to proceed. This could vary from an additional limitation placed upon the Schedules to the ITSO Certificate to the withdrawal of the previous ITSO Certificate in extreme circumstances.

2.12. Disputes and the ITSO Appeals Process

In the event that the ITSO Registered Supplier disagrees with any decision made by ITSO, then they may enter into the ITSO Appeals process. Disputes with Test Results should in the first instance be noted in the agreed version of the Test Report. Any other issues with the ITSO Test Laboratory should be taken up directly with the Test Laboratory.

3. CERTIFICATION CATEGORIES

3.1. Certification of Customer Media (CM)

CM are to be loaded with ITSO Shells and IPE TYP2 (Stored Travel Right) using ITSO certified Personalisation POSTs and Test Keys.

Testing will follow all relevant Tests using the ITSO Customer Media Test Tool and also against all currently certified POSTs in the ITSO Interoperability Warehouse. The transaction times must meet the requirement as applied to the POSTs that the CMD is being tested against.

ITSO will not provide a certificate to any media where the overall Benchmark Transaction Time is greater than the target benchmark transaction time as published in the ITSO Specification where there are no other category derogations applying.

Meeting the required Benchmark Transaction Time in the ITSO warehouse is a pre-requisite for the issue of a certificate for all CMD.

CMD1: No new certificates issued.

CMD2: Certification may be carried out with a native ISO filing system enabled micro-processor media supporting either Secure Messaging mode (using 3DES with diversified password), or in Simple Messaging mode.

CMD3: No new certificates issued.

CMD4: Media to be left blank for certification. Blank media will then be loaded with the ITSO Compact Shell and a relevant IPE, using the ITSO Test Keys

CMD5: Media to be left blank for certification. Blank media will then be loaded with the ITSO Compact Shell and a relevant IPE, using the ITSO Test Keys.

CMD6: Not available for certification.

CMD7: Media to be left blank for certification. Certification to CMD7 covers any DESfire (including EV1 Platform) in Native mode. This may be in 4k and 8k variants, but NOT 2k.

CMD8: Media to be loaded with Calypso AID. Certification may be carried out in Native mode with an ITSO Application pre-loaded. Secure Messaging must be enabled in all cases.

3.1.1. CMD2 Platform

Certification or Approval shall be given separately to each unique build standard. This shall be verified by the ITSO Testing Laboratory adding and testing the platform using test application Software and a defined range of test Shells (i.e. small, default and large).

The certificate will differentiate between the Messaging mode supported. This Media type can only be certified if it is loaded with an ITSO Shell using a valid ITSO certified Personalisation POST; or the relevant Personalisation POST is submitted for Testing and Certification at the same time. The methodology for providing a CMD2 media for use in the ITSO environment is different from the other platforms in that there are two components or stages that are needed before one can be used. The first stage relates to the media itself and the second to the applet that is loaded onto it. Both of these components can have an impact on the possible transaction times that a card may achieve. The operating systems must have a level of security that mitigates against tampering with their content (particularly for CMD2 Applets on Java card or NFC phones).

3.1.1.1. CMD2 Application Software Approval

This will be given separately to any a given version of Application Software. This shall be verified by an ITSO Testing Laboratory adding the Application SW to a defined range of approved platforms and then carrying out the tests as for CMD2 platform Approval

3.1.1.2. CMD2 Shell Certification

This shall be given separately for each unique build standard of the platform hardware having a given version of an operating system with additional application Software as required configured with the configuration(s) of Shell (i.e. small, default and large) that are to be issued by the Shell Owning ITSO Licensed Member(s). The resultant fully personalised CM + ITSO Shell shall be verified by the ITSO Testing Laboratory. The ITSOTesting Laboratory shall utilise a selection of test IPEs as part of the process. In the event that a Personalisation Bureau wishes to prove its ability to provide functioning CM / Shell combinations then they may submit an agreed "Test Shell" for Certification but this shall not remove the obligation for a Licensed Member that uses that Bureau to verify their own Shell configurations individually through an approved ITSO Testing Laboratory.

3.1.1.3. Testing Multiple CM configuration options on CMD2

For CMD2, the generic operating system may have a SW application loaded onto an underlying operating system that is used to emulate an ITSO CM carrying an ITSO Shell. To ensure that the many combinations of CM platform as supplied by the card manufacturer (i.e. Java Card) + CM application Software (i.e. applet) + ITSO Shell issued by an ITSO Licensed Member will interoperate within the ITSO environment it is required that the CM Platform Hardware, the Application Software and the ITSO Shell are all tested as part of the overall ITSO approval, certification and verification process:

3.2. Certification of PersoPOSTs

Whilst ITSO does not wish to specify the complete personalisation process of a media on which other applications reside, unless there is a minimum security level applied to the loading of ITSO Shells onto a Licensed Member's CM, there is a risk that the media may remain open to attack. Similar criteria need to apply if the ITSO Shell is loaded on a CM that has been issued by a third party (i.e. a bank or other authority); however the control ITSO has over this process can only be agreed by mutual consent through the ITSO Licensed Member.

3.3. Certification of POSTs

A POST must be able to establish the presence (or otherwise) of all Product Instances of all ITSO Product Entity (IPE) types in the Directory prior to handling the specific IPEs for which they are designed.

The POST must support ITSO IPE TYP2 unless only supporting IPE TYP27-29. The ITSO Registered Supplier can select other IPEs and the functionality (Create, Modify, Accept or Delete) supported by the POST under test. This must be declared during the Application Process. POSTs shall recognise all Media types and support those relevant to the IPEs supported.

The Minimum Functionality of a POST may separately be defined by an ITSO Licensed Operator Sector (e.g. bus or rail) and a POST will be tested for conformance to the relevant sector minimum standards as documented.

Testing will follow all ITSO POST Tests against the standard ITSO Customer Media Test Tool and also against all currently certified POSTs in the ITSO Interoperability Warehouse. The transaction times must meet the requirement as applied to the POSTs that the CMD is being tested against.

ITSO will report in Schedule A to a certificate any POST where the overall Benchmark Transaction Time is greater than the target Benchmark Transaction Time as published in the ITSO Specification. Where the Benchmark Transaction Time is greater than that allowed by a ITSO Licensed Member or Sector Derogation (e.g. for off-line bus ETM), then a Certificate will not be issued.

Meeting the required benchmark transaction time in the ITSO warehouse is a pre-requisite for the issue of a certificate for all POSTs.

The POST must correctly communicate with HOPS with Collection & Forwarding functionality.
Off-line or hand-held POSTs with self contained power sources may be considered with reduced functionality and / or extended transaction times in accordance with the ITSO criteria for that sector.

3.3.1. Creating ITSO Shells on a POST

The ITSO Specification allows ITSO Shells being created by a Retail POST in either attended or unattended modes. However in order to maintain the integrity of the ITSO environment it is essential that such a Retail POST comply with the minimum configuration requirements listed above.

3.4. Certification of HOPS

HOPS can be considered for Full Functionality, Collecting and Forwarding, Shell Accounting, Product Accounting, Asset Management, or any combination.
HOPS will be tested to verify transactions from POSTs and between other HOPS and AMS, and handle on-us / not-on-us transactions and List processing from another HOPS to the POSTs connected to it. This includes all messaging requirements to and from POSTs and the management and integration of all lists requirements from other HOPS to POSTs.

4. THE ITSO INTEROPERABILITY WAREHOUSE.

This section describes the ITSO Interoperability Warehouse.

4.1. New Additions

As soon as a product is certified, the ITSO Registered Supplier will hand over free of charge one working copy of the product to ITSO for inclusion in the ITSO Interoperability Warehouse. For Customer Media additional samples may be required, particularly where one-time-programmable (OTP) data is utilised in the Product.

Where it is physically impossible to store the product in the ITSO Interoperability Warehouse (e.g. a PersoPOST weighing greater than 25kg, or a server based HOPS) alternative arrangements may be agreed. At ITSO's discretion, the ITSO Registered Supplier may limit the provision to a sub-module of the media interface plus a PC based emulation of the POST software and/or remote connection with the physical POST (e.g. via TCP/IP, X.25, Internet communications link). ITSO reserves the right to carry out further Interoperability Tests on the full Product at the Registered Supplier's premises and at their expense and with reasonable notice, or at a suitable nominated field location using a live POST.

Failure at any time to allow reasonable access to any certified Product may lead to revocation of the Certificate for that Product.

In the case of a HOPS, the ITSO Registered Supplier may provide remote access to the Product through a connection with the host (e.g. via TCP/IP, X.25) and must confirm the ITSO prescribed interface (ITSO messages/XML/VPN over Internet). In these circumstances the ITSO Interoperability Warehouse Service Provider will provide reasonable notice of the need for access, and the ITSO Registered Supplier must make such access available.

Together with the Product, the ITSO Registered Supplier will also provide:

- Documentation that describes the operation of the Product (user manual and, if available, technical papers on incident codes, debug and maintenance options).
- Contact details of a Technical Representative with substantial technical expertise who will provide telephone support (free of charge) during all and any Test Sessions at the ITSO Interoperability Warehouse. The contact should be available during normal office hours and to react on a query within 1 working day by telephone or e-mail.

The ITSO Registered Supplier shall also provide all relevant IPR / Software Licenses that are applicable to the Product being tested on a free of charge basis to ITSO, to allow the operation of the product within the ITSO Interoperability Warehouse.

The ITSO Registered Suppliers' deliverables will be recorded in the ITSO Interoperability Warehouse Inventory. An inventory entry will consist of Date of arrival, Product Identification (manufacturer, model, type, serial number, software versions and checksums), and Documentation supplied. The Product will be provided with a unique ID and be labelled.

The ITSO Interoperability Warehouse will record which other Products have been tested against the Product during subsequent Test Sessions.

4.2. Security Issues

ITSO Registered Suppliers' staff will have access to the ITSO Interoperability Warehouse during interoperability tests. To assure the products' integrity, the following rules will apply:

- The ITSO Interoperability Warehouse will assign a Manager responsible for security.
- When the ITSO Interoperability Warehouse is not in use, the doors will be locked.
- All visitors will be logged. Log entries will contain Name, Company, Time of Arrival, Time of Departure, Accompanying staff
- An ITSO Interoperability Warehouse staff member must accompany visitors when present in the ITSO Interoperability Warehouse area.
- ITSO will be bound by non-disclosure agreements and principles.
- The operation of the items in the ITSO Warehouse is restricted to the ITSO staff and contractors.
- At the end of a Test Session, the ITSO Interoperability Warehouse Service Provider will check the ITSO Warehouse's inventory for completeness.

4.3. Administration and Maintenance

The ITSO Interoperability Warehouse is a dynamic environment in the sense that by interacting with each other, the state of the Products will be different at the end of every Test Session. Moreover with every successful certification, the inventory of the ITSO Interoperability Warehouse increases.

At the end of each Test Session the ITSO Interoperability Warehouse Service Provider is responsible for:

- Recording the state of the Products used in the ITSO Interoperability Warehouse tests,
- Restoring known configurations (e.g. re-loading a set of known parameters).
- Where appropriate resetting factory defaults.
- Emptying transaction stores, buffers

4.3.1. Maintenance

The ITSO Registered Supplier will agree to maintain with reasonable endeavours the Product so it remains serviceable and to provide stock of any consumables required for its continued operation whilst lodged in the ITSO Interoperability Warehouse. ITSO may, at its sole discretion, require more than one version of software to be available in the Interoperability Warehouse for the purposes of Interoperability Demonstrations, particularly of there are significant variances between versions of software. This is to ensure that interoperability across field versions of the Product is maintained.

5. NORMATIVE REFERENCES

- ITSO Specification TS1000
- ISO/IEC Guide 65 General Requirements for bodies operating Certification Schemes
- ISO/IEC 17025 General Requirements for the competence of testing and calibration laboratories